

XLV. *Observation of the Transit of Venus, and other Astronomical Observations, made at Gibraltar; contained in a Letter to the Astronomer Royal from Lieutenant Jardine.*

To regulate the clock.

Read Dec. 7, 1769. **A**N equal altitude instrument was fixed (nearly such as is described in Smith's Optics, vol. II. p. 328), on which was mounted a small telescope with cross hairs.

| | | Sun's upper limb touched the ho- rizontal hair at | | | Sun's lower limb touched the ho- rizontal hair at | | |
|--------|-----------|---|----|----|---|----|----|
| | | h | ' | " | h | ' | " |
| June 1 | Morning | 8 | 32 | 43 | 8 | 35 | 8 |
| | Afternoon | 3 | 24 | 33 | 3 | 22 | 0 |
| 2 | Morning | 8 | 32 | 20 | 8 | 34 | 46 |
| | Afternoon | 3 | 25 | 4 | 3 | 22 | 36 |
| 4 | Morning | 8 | 32 | 27 | 8 | 35 | 13 |
| | Afternoon | 3 | 25 | 27 | 3 | 22 | 47 |
| 5 | Morning | 8 | 32 | 35 | 8 | 35 | 10 |
| | Afternoon | 3 | 25 | 53 | neglected | | |

TRANSIT OF VENUS.

By three observers, with two $7\frac{1}{2}$ feet refractors, and one 2 feet reflecting telescope.

| | h | ' | " |
|---|-----|----|-----|
| June 3, Venus's 1st external contact with the Sun, at | 6 | 49 | 58 |
| 1st internal contact with the Sun, at | 7 | 7 | 11 |
| Sun set behind a hill | 7 | 8 | 3 |
| Clock before mean time | 9 | 1 | 8,8 |
| Y y 2 | For | | |

For the LATITUDE of the place.

Observed by a Hadley's quadrant, divided into minutes, the double meridian altitudes of Jupiter and Cor Scorpii, reflected from water.

| Double meridian altitude of Jupiter. | | | Double meridian altitude of Cor Scorpii. | | |
|--------------------------------------|---|----------|--|---|---------|
| | ° | ' " | | ° | ' " |
| May 30 | = | 77 6 | June 28 | = | 56 7 |
| June 14 | = | 77 50 | 29 | = | 56 5 |
| 17 | = | 77 55 30 | July 7 | = | 56 6 30 |
| 21 | = | 78 3 30 | 8 | = | 56 5 0 |
| By another observer, | = | 78 3 0 | | | |
| June 22 | = | 78 4 0 | | | |
| 29 | = | 78 10 45 | | | |
| July 4 | = | 78 14 0 | | | |

Clear weather, in general, during these observations; and }
 Fahrenheit's thermometer, in the middle of the day, between } 75 and 80
 in the night, between } 68 and 71

For the LONGITUDE of the place.

| | | h | ' | " | |
|---------|---------------------------------------|----|----|-----|---|
| May 30 | Emerſion of Jupiter's firſt ſatellite | 12 | 59 | 56 | |
| | Clock before mean time | 0 | 1 | 2 | |
| May 31 | Emerſion of Jupiter's 2d ſatellite | 10 | 51 | 51 | |
| | Clock before mean time | 0 | 1 | 3½ | |
| June 8 | Emerſion of Jupiter's firſt ſatellite | 9 | 22 | 34 | } Theſe two are moſt to be depended upon. |
| | Clock before mean time | 0 | 1 | 16½ | |
| June 15 | Emerſion of Jupiter's firſt ſatellite | 11 | 15 | 54½ | } uncertain to perhaps 5 or 6" |
| | Clock before mean time | 0 | 1 | 28 | |
| June 25 | Immerſion of Jupiter's 3d ſatellite | 11 | 59 | 56 | } uncertain to perhaps 5 or 6" |
| | Clock before mean time | 0 | 1 | 44 | |
| July 8 | Emerſion of Jupiter's firſt ſatellite | 11 | 30 | 57 | |
| | Clock before mean time | 0 | 2 | 4 | |

ECLIPSE

ECLIPSE OF THE SUN.

| | | | | | | |
|--------|------------------------|---|----|----|---------------------------------|--|
| | | | h | ' | " | |
| June 4 | First contact at | 6 | 6 | 54 | seen perhaps a little too late. | |
| | Last contact at | 7 | 19 | 28 | exact. | |
| | Clock before mean time | 0 | 1 | 9 | | |

Elev. of ☉'s l. limb by Hadley's quad. at { 1st contact 14 41 } both ex-
 { 2d contact 28 55 } act.

Dip of the horizon, for 160 feet above the level of the sea, is to be allowed.

S I R,

I Have been disappointed in the pleasure I promised myself, when I saw you, of observing some occultations of fixt stars, by the Moon, &c. We shall be glad, if these observations can be of any service. We have endeavoured to discover to you the degree of dependance to be placed thereon.

With regard to the clock, we conclude from these equal altitudes (correcting for difference of declination, &c.), that, on the 3d of June, it was before mean time 1' 8'', 8. You will easily discover if there is any error. We afterwards regulated by frequent equal altitudes, by a meridian line on the bottom of a window, and by the setting of stars behind some solid buildings.

The latitude appears, from these double altitudes, to be somewhere between 36° 3', and 36° 4'; but from more correct declinations, &c. you will be able to determine it more precisely.

For the eclipse, we had no micrometer, nor any other method of determining the quantity of it.

To the eye, between $\frac{1}{4}$ th or $\frac{1}{5}$ th of the Sun's diameter seemed to be eclipsed. Though the beginning be rather incorrect, the end may be depended on.

We shall be glad if you can determine, from hence, the latitude and longitude of the place, and to know the result of the discoveries made in our system, by the observations of the late transit, if you will favour us.

I am,

S I R,

Your most obedient,

humble servant,

Gibraltar, July 14,
1769.

Alexander Jardine.

By re-computing these observations, I find, that the external contact of Venus happened at $6^h 51' 8''$, the internal contact at $7^h 8' 21''$, the beginning of the eclipse of the Sun at $18^h 8' 0''$, and the end at $19^h 20' 33''$, all apparent time; and that the latitude of the place, by the mean of the 4 altitudes of Cor Scorpii, is $36^\circ 4' 44''$, N. The dip of the horizon of the sea, for an elevation of 160 feet, may be reckoned $12' 5''$.

Nevil Maskelyne.